E-00000J-13-0375

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Arizona Corporation Commission
DOCKETED

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DOCKETED BY

Arizona Corporation Commission
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AZ CORP COMMISSION
DOCKET CONTROL

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Subject: In Re Docket # E-00000J-13-0375 Innovations & Technological Development Commissioner R. Burns Call for Comments

I believe that this docket is critical and necessary to facilitate the fair and comprehensive valuation of new generation and consequent delivery technology that is required to determine the appropriate mix optimizing total costs to ratepayers.

Ratepayers are the same persons with the same interests as taxpayers and must use their funds to pay for costs incurred by other Agencies (i.e., EPA, FERC, etc.) to mitigate the external costs generated by generation technology approved by the Arizona Corporation Commission (ACC) that has a fundamental constitutional objective and responsibility to optimize benefit to ratepayers. History has demonstrated how those costs eventually end up in ACC rates and surcharges; fuel(carbon), Environmental Compliance Adjuster(ECA, visible emissions,

The docket's intent appears to recognize that regulated markets, current "Cost Plus Profit" vs. "Pay For Performance" (value to customer; earn fee by sharing of cost reductions) rate & reward structures, lack the continuous improvement incentives inherent in most competitive markets that naturally promotes constant innovation, development and integration of new technologies necessary to reduce costs, increase value, retain and acquire customers. It may be beneficial to include a workshop in this docket to determine how best to address that constraint.

As requested, following are my comments regarding the benefits of accelerated deployment and integration of new technology.

I. Distributed, Utility Scale PV Generation, Storage and Metropolitan Micro-Grids (MMG)

Included in this submittal is a copy of my 4-page 12/5/13 letter to TEP Director Sheehan regarding Tucson Electric Power Company's (TEP) preliminary 2014 Integrated Resource Plan that appear to be directly relevant to this docket. In general, providing comment and solutions regarding Utility scale generation & storage, what I refer to as *Metropolitan Micro-Grids* (MMG); multiple large utility operated dispersed and "distributed" generation facilities with circuit storage components sited within or adjacent to and interconnected to the utility's distribution infrastructure.

The Storage component is critically required to enable and manage the transition from conventional (coal, gas) to new technology generation (PV; Wind) and would also improve system reliability, avoidance of "black-outs" and resultant financial damages. The concepts and actions are also applicable to all regulated utilities.

Summary principles and benefits include:

More than $1B per year of fossil fuel related surcharges, $25B over the 25-year expected life of a typical solar electric facility, plus transmission infrastructure and transmission energy losses and incremental generation costs/charges could be avoided or mitigated via development of multiple dispersed local utility scale solar electric(PV) generation and storage facilities (MMG's).

- Fuel Surcharge(PPFAC) Currently $350m/year; $8.75B over expected life of solar PV; significant annual increases in current cost are probable and not included.
  - PV solar incurs no fuel cost; would mitigate PPFAC and probable cost increases and provide valuable price & cost ***stability & certainty*** over the life of those assets
  - Avoid imminent increases in natural gas costs as North America increase their export capacity of natural gas to more lucrative markets (India, Japan, Asia, $18-$23 vs. $3 North America)
  - Avoid increases in PPFAC consequent to new green house gas (GHG) penalties; est. for total TEP sales to be $5B over 25 year life of a solar facility; $20/ton at current mix = 2c/kWh; TEP sales of 10B kWh/year = $200M/year)
  - A new study by the National Academy of Sciences USA indicates that atmospheric GHG levels are much higher than previously understood, which will accelerate and increase the probability of Federal action to limit GHG emissions (http://www.pnas.org/content/early/2013/11/20/1314392110.abstract)

- Environmental Compliance Adjuster surcharge (ECA) $350M 2014; future years unknown. Local PV generation & storage would enable reduced base load run rate and emissions, potentially at levels that would not require any expensive equipment expenditures on assets with minimal future life/value; using those funds to deploy more local PV generation would reduce emissions and provided better return on investment.

- Demand/TOU surcharges & GHG Costs; Est. $600M/year current cost; $15B over 25-years; does not include future increases in those costs.
  Local Solar Electric generation and storage would reduce, perhaps eliminate, the need for expensive natural gas 'peaker' plants, spinning reserves that generate GHG emissions, and are subject to volatile and significant increases in future fuel costs(PPFAC)

- Water costs ($ benefit unknown).
  Generation via steam loses about ¾ gallon of precious water, typically potable; about 7.5B gallons/year at current TEP sales rate; 187.5B gallons over 25-year life of solar PV. Regional precipitation and the availability of potable water is reduced by GHG emissions. D. Modeer has previously indicated that alternative water sources will cost 10-50 times more than present sources. Those costs will be paid by water utility ratepayers.

- Transmission Infrastructure ($ benefit unknown; currently about 10% of TEP Residential bill). Fossil fueled & remote generation requires transmission infrastructure. Local (PV) generation reduces transmission infrastructure related costs; conserves capacity until present remote generation plants reach end of life; ultimately transmission will be utilized solely for grid/reliability, kWh purchases IF needed.

- Transmission energy loss ($ benefit unknown) 4-8% of energy is lost during transmission, requiring incremental generation, related fuel, water and emissions costs, including more energy loss.

- Reliability ($ benefit unknown) Dispersed local multiple local PV solar electric facilities and storage mitigate intermittency issues, improve reliability, and avoid "Black-Out" events and tremendous financial damages (APS/San Diego; Ohio/East Coast).

    - Avoid the need and cost to cease Springerville Base Load Plant operation due to wildfire threat to transmission, resulting in $15M "true-up" charge to Ratepayers last year

- Customer Class Rate Equity; As much as $150M/year, $3.8B over 25-years. Precise data regarding which customers receive special rates (3-4c/kWh) and for what quantity of kWh is not available. Financials impact calculation based on Roshka/TEP 10/11/11 response to Commissioner Newman and included in the TEP 2012 REST Docket; Mining/industrial represent about 22% or 2.1B kWh of TEP annual sales; 80% of kWh at 9c/kWh differential in Mine vs. Residential rates)

  Coal base load plant run rates are not *dispatchable*, resulting in the need to sell electricity at less than cost to a few customers at night when demand reduces dramatically, shifting recovery of costs to all other customers. Utility scale Storage would eliminate that need and allow significant reductions in rates to almost all ratepayers. Customer rate equity was a recent concern of APS (13-0248) and the ACC requiring multiple days and costs to resolve; this rate equity issue involves much greater amounts and impacts all ratepayers.

- Potential Supplemental Revenues, Capital & Other Benefits
    - Renewable Energy Facilities enable superior & greater Federal & State tax benefits; Income Tax Credits & Accelerated Depreciation; than other generation equipment
    - Federal Clean Technology Grants could be acquired to model/deploy MMG
    - Sale of REC's on developing carbon markets and increased DOE/DOD Presidential Mandate
    - No/low cost lease of Public lands, local governments, on which to site local facilities
    - Leverage Utility Purchases of generation to incite market to simultaneously partner/provide economical storage technology as a "system"
    - Increased & sustained demand for these solutions would incite private sector investment, competition, and continue the remarkable reduction in solar electric solution costs which have exceeded the price/functionality improvements demonstrated by personal computers and cellphone products
    - Economic Stimulus/Development
      Arizona & California (33% renewables; 1.3GW of storage by 2020) demand for these solutions would support significant investment by private sector, create higher wage construction and recurring component manufacturing jobs, promoting population growth and regional trade revenues, higher electricity sales and tax revenues enabling lower rates. Arizona has lower wages, cost of living than California and

could successfully compete for component manufacturers to locate in Arizona providing recurring diverse benefits.

II. Customer Self-Supply: Aggregated & Virtual Net Metering (ANM/VNM)

The Commission previously opened docket 10-0202 to evaluate Aggregated Net Metering (ANM), similar to Virtual Net Metering (VNM), a version of the current Net Metering (NM) rule. A workshop was completed that documented significant support but the docket remains open, was not brought to a vote.

ANM would allow local governments & school districts, whose costs are paid for by taxpayers, the same persons as ratepayers, to establish solar facilities on property they own or control, interconnect to the local distribution grid, and credit at the retail rate to their many urban meters. Staff ROO suggested that the generation facilities be connected on the customer side of the meter, no different than Net Metering, which is not plausible as the loads are derived from downtown/urban areas where there is insufficient land on which to site the generation facilities.

In TEP Territory Public Service (PS-40/now GS-10) customers receive a slightly reduced rate. Utilities have no costs except for Distribution, and would benefit by selling the ANM generated electricity to customers closer to the generation point, most all with higher retail rates than "Public/General Service", recovering all Distribution costs.

I believe that the Commission should consider implementing ANM & VNM, and if necessary to recover distribution system costs related to the lost sales via no more than a 2c/kWh "Distribution Grid" charge. If considered appropriate, pilot the program via ANM, add VNM within a couple of years.

Public Agencies could/would conduct Cooperative Procurements for 300-400MW of SSA's over multiple years. If Utilities innovate to reduce and control costs and rates to those that are "competitive" with commercial scale self-generation, most customers would not seek the responsibility of self-generation.

III. Potential workshop presenters

ANM/VNM: Kevin Fox; kfox@keyesandfox.com Mr. Fox conducted the ANM workshop (Docket 10-0202) and compiled the associated summary of comments. Kris Mayes, ASU Director/Sustainability, former AC Chair, sponsored the ANM docket (Kris.Mayes@asu.edu ; (602) 757-7434)

CPV/Thermal & Compressed Air Storage: Valerie Rauluk, Venture Catalysts (vajra@vecat-inc.com 520-326-3195); Valerie has represented 3rd party Technology & Project developers, and manufacturers, worked with local utilities and provided testimony to the ACC.

Utility/Commercial Scale Storage Liquid Metal Battery: **Kristin Brief,** Director of Corporate Development & Treasurer, **Ambri Inc.** 19 Blackstone Street, Cambridge, MA 02139;

617.714.5723 ext. 45344 kbrief@ambri.com www.ambri.com AMBRI is associated with the Michigan Institute of Technology

California MMG: Local Generation/1.3GW Storage:
Adam Browning/Vote Solar; abrowning@votesolar.org; (415) 817-5062
Utility Compressed Air Storage: Tom Hansen, Retired TEP VP Engineering; Springerville, AZ; thengineer@frontiernet.net

In closing, I appreciate the opportunity to provide my comments observations and potentially work with you and the Commission to provide great, diverse and recurring value to Arizona and Ratepayers.

Sincerely,

Mr. Terry Finefrock, CPIM
TEP Ratepayer

Attachment: Finefrock/Sheehan 12/5/2013 TEP 2014 IRP Comments letter; 4-pages

December 5, 2013

Michael Sheehan, Director Resource Planning
Tucson Electric Power Company
Tucson, AZ 85701
Via email: tepirp@tep.com

Director Sheehan,

I am writing to provide comment and suggestions regarding the development and content of Tucson Electric Power Company's (TEP) 2014 Arizona Corporation Commission (ACC) Integrated Resource Plan (IRP).

I attended the November 22, 2013 TEP IRP workshop and was impressed by TEP's recognition regarding the need to significantly change their generation mix, reduce total costs, that continuing price increases and external costs consequent to the selected generation technology is the primary causal factor motivating customers to deploy self-generation options.

In particular I was encouraged by TEP's recognition that they need to responsibly accelerate significant reductions in fossil fueled generation; informal discussion with TEP senior staff indicated that your simulations indicate that the optimal mix of generation is equal portions (1/3rd) of renewable energy, natural gas and coal; that there were obstacles requiring resolution to achieve that mix. At this time the plan is to replace 30% of coal generation with natural gas within the next 5-years, which may significantly reduce harmful emissions but will continue to use/lose significant amounts of precious potable water to evaporation and is subject to significant cost/price increases as natural gas exports to international markets with significantly higher costs & margins increases. A new study by the National Academy of Sciences USA http://www.pnas.org/content/early/2013/11/20/1314392110.abstract that included EPA and DOE preliminary validation indicates that historical green-house gas measurement methodology is flawed, significantly understating atmospheric content.... "*emissions due to fossil fuel extraction and processing could be 4.9 ± 2.6 times larger than in EDGAR, the most comprehensive global methane inventory.*" This new finding may result in accelerated actions and penalties to reduce fossil fuel GHG that will result in significant increases in the cost of fossil fuels and fuel surcharges.

I and many others were disappointed that the IRP included no actions to increase or accelerate achievement of the current ACC REST mandate, 15% by 2025, nor any formal plans & schedules to promote the development of cost effective energy storage solutions, which would facilitate accelerated implementation of renewables and achievement of a significantly improved generation mix and costs to ratepayers.

Following are changes in strategy, tactics and option simulation methodology that I suggest that TEP consider for incorporation in their IRP that would promote the financial sustainability of TEP, optimize benefit to the Ratepayer, an Arizona Constitutional requirement of the ACC, and enable accelerated transition to the optimal generation & delivery technology mix that includes 33% renewables:

1. **Modify TEP's IRP to aggressively promote the near-term development and deployment of feasible Utility scale electricity-energy *Storage* solutions**

Feasible 'distributed" storage solutions would reduce the constraints and complexity involved with the integration of multiple generation technologies and would enable the deployment of more "distributed" local renewable/solar electric generation; essentially utility scale "Municipal Micro-Grids" (MMG) interconnected to or within the distribution infrastructure to avoid, control and/or reduce costs.

Storage, combined with distributed generation via multiple dispersed sites, would eliminate or mitigate complex "intermittency" and "demand-supply balancing" issues associated with solar electric generation enabling accelerated deployment of solar electric solutions and significant reductions, perhaps elimination, of the more than $1B per year of current and increasing TEP PPFAC, ECA and Demand/TOU surcharges. As solar facilities are implemented, and related fossil fueled generation costs the surcharges are intended to recover are reduced, the surcharge revenues can be used to fund more solar electric and storage facilities. As optimal generation/delivery mix is achieved, the surcharges can be eliminated/reduced and perhaps shared between ratepayers and shareholders.

Greater local solar electric generation would also reduce transmission infrastructure maintenance costs, 10% of a current TEP residential bill, and the consequent energy line loss costs resulting in incremental generation and related surcharge costs. Current transmission capacity can be conserved as remote coal base load plant generation is displaced and approaches end of life, requirements for it are reduced to providing base supply/reliability if necessary.

Storage combined with local solar electric generation would also eliminate the need to sell coal plant electricity at less than cost (3-4c/kWh) to a few customers, shifting recovery of as much as $190M/year[1] of costs to other customers (13c/kWh), enabling improved equity in customer class costs/rates, and reductions in costs for most customers. This is a rate equity issue similar to the recent issue involving residential class customers that the ACC felt merited several days of their time and our costs to resolve, but of much greater magnitude and impact to almost all customers.

Increased multi-year Utility scale demand for solar electric facilities will continue the reduction in Solar electric costs which have outperformed price-functionality curves demonstrated in competitive (non-regulated) markets by personal computers and cell-phones.

Utility procurements for the solar generation can, and should be used to leverage and support private sector provision of economically feasible storage solutions; requirements and preferences should be given to those Suppliers that provide storage with the generation equipment.

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[1] Source: Roshka/TEP 10/11/11 response to Commissioner Newman; Mining/industrial represent about 22% or 2.1B kWh of TEP annual sales; 9c/kWh differential in Mine vs. Residential rates; $190M. Information regarding which customers receive special rates (3-4c/kWh) and usage is not available

Local governments can provide low/no cost leases of public land on which to site the facilities as they provide significant recurring benefit to the Public.

Federal Clean Technology grant funds can be requested; this model could be of use by other western states/utilities.

The State of California is deploying an MMG strategy; renewables mix of 30%; preference for "local" vs. remote generation/imports; reduced transmission costs; will locally generate its electricity requirements and deploy 1.5 GW of storage by 2020.

The higher wage jobs will promote population growth, perhaps local manufacturing of components, resulting in greater electricity sales and absorption of fixed costs over greater unit sales, enabling rate reductions or curtailment of rate increases.

2. **Change TEP's current financial simulations modeling and valuations to consider probable future changes in each generation technologies major component costs over a 25-30 year period (asset life), include the delivery methods and costs required by each generation resource, and the "external" costs likely to end up in rate base as demonstrated by the PPFAC(carbon penalty) and ECA(Emissions penalties).**

For example, coal, and natural gas, dependent on the plant location(remote), results in much greater transmission infrastructure/energy loss, fuel escalation (market demand, carbon, visible emissions), financing capital, etc. costs than does solar electric generation. Per CitiGroup Analysts, investment in coal is not recommended, and natural gas recommended solely for the short-term; too much risk and price volatility, probable increases in capital costs, regulation, and prices are projected; investments in potential storage solutions are recommended.

The current model does not appear to consider nor promote leveraging of the current Federal income tax & accelerated depreciation rule benefits regarding renewable energy investments.

Although the TEP model considers the emerging national carbon penalty as a cost(PPFAC), it may not consider the potential revenue benefit via sale of renewable energy credits (REC) on national markets; 2c/kWh of revenue relative to a 13c/kWh Residential rate would enable a 15% reduction in rates.

The current model does not appear to project nor consider the different generation resources consumption of potable water, the competitive use for human consumption and food production, nor the costs of alternative source development. Most forms of steam generated electricity lose up to ¾ gallon/kWh to evaporation, about 7.5B gallons each year at current TEP annual sales; D. Modeer has stated that alternative sources of water will cost 10-50 times more than current sources; use by utilities conflicts with human consumption and food production requirements; all potable water controlled by private, and especially for-profit ownership, will likely be subject to great undesirable conflict, perhaps eminent domain seizure.

Although "External" Costs cannot be included in the rates or surcharges as they are not directly incurred by the utility, the selection of generation technology, including the consequent

delivery requirements and costs, should be considered and costs minimized as they are charged by the mitigating Agency to ratepayers as taxpayers and as history has demonstrated eventually end up in the rates/surcharges (PPFAC/carbon; ECA/Visible emissions). In particular "water" costs which are incurred by water utilities regulated by the ACC.

3. Utilize reclaimed vs. potable groundwater where available

As discussed during the workshop TEP uses potable groundwater for their local generating stations. Pima County is nearing completion of an almost $1B upgrade to their wastewater treatment facilities that will generate some of the cleanest effluent in North America, much of which is presently discharged to the Santa Cruz.

Tucson Water maintains reclaimed water conveyance infrastructure that could deliver reclaimed to TEP plants. Although there may be additional costs for TEP to utilize that reclaimed water, those costs can likely be absorbed with minimal impact or mitigated via a typical special rate negotiated with Tucson Water if necessary, to provide significant recurring and responsible benefit to both water ratepayers, shareholders and our community.

In closing, I truly appreciate and am encouraged by the significant change in strategy and continued community responsibility demonstrated by TEP's IRP presentation. I am hopeful that my observations and suggestions will facilitate the accelerated implementation of renewables & storage to reduce and avoid future costs and serious consequences.

I believe that these suggestions are prudent and supportive of the ACC's constitutional responsibility to optimize benefit to ratepayers; our ACC needs to hear and commence implementation of them, an often time-consuming and lengthy process; IRP is an appropriate forum to initiate that discussion without further delay.

Electricity is not a "discretionary" commodity. TEP employs and controls an incredible amount of resources, talent and knowledge that can be focused to accelerate continuous improvement, establishment of a total cost reduction/control culture, to provide the needed recurring economic stimulus, population and manufacturer growth and the resulting increase in electricity sales necessary to sustain and provide value to ratepayers, shareholders and our community.

Sincerely,

Mr. Terry Finefrock, CPIM
Long term TEP Ratepayer & Resident
Former Corporate Director, global supply chain/high technology manufacturing

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